



**KAPREALIAN ENGINEERING, INC.**

*Consulting Engineers*

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91 MAR 27 AM 11:02

March 25, 1991

Alameda County Health Care Services  
80 Swan Way, Room 200  
Oakland, CA 94621

Attention: Ms. Cynthia Chapman

RE: Unocal Service Station #3135  
845 - 66th Avenue  
Oakland, California

Dear Ms. Chapman:

Per the request of Mr. Rick Sisk of Unocal Corporation, enclosed please find our report dated March 25, 1991, for the above referenced site.

Should you have any questions, please feel free to call our office at (707) 746-6915.

Sincerely,

Kaprealian Engineering, Inc.

Judy A. Dewey

jad\82

Enclosure

cc: Rick Sisk, Unocal Corporation



## KAPREALIAN ENGINEERING, INC.

Consulting Engineers

P.O. BOX 996 • BENICIA, CA 94510  
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KEI-P88-1203.QR2

March 25, 1991

Unocal Corporation  
2000 Crow Canyon Place, Suite #400  
P.O. Box 5155  
San Ramon, California 94583

Attention: Mr. Rick Sisk

RE: Quarterly Report  
Unocal Service Station #3135  
845 - 66th Avenue  
Oakland, California

Dear Mr. Sisk:

This report presents the results of the second quarter of monitoring and sampling of the monitoring wells at the referenced site by Kaprealian Engineering, Inc. (KEI), per proposal KEI-P88-1203.P2 dated May 31, 1990. The wells are currently monitored monthly and sampled on a quarterly basis. This report covers the work performed by KEI from December, 1990 through February, 1991 concerning ground water monitoring and sampling activities.

### SITE DESCRIPTION AND BACKGROUND

The subject site is presently used as a gasoline station. The vicinity of the site is characterized by gently sloping southwest trending topography and is located approximately 3,400 feet northeast of the present shoreline of San Leandro Bay and approximately 500 feet northwest of Lion Creek. A Location Map and Site Plans are attached to this report.

KEI's work at the site began on December 8, 1988 during modifications to the pump island located along San Leandro Street. Three soil samples were collected from undisturbed soil at depths ranging from 2 to 3 feet. The samples were analyzed by Sequoia Analytical Laboratory in Redwood City, California, for total petroleum hydrocarbons (TPH) as gasoline, and benzene, toluene, xylenes and ethylbenzene (BTX&E). Analytical results of the soil samples collected beneath the pump island indicated non-detectable levels of all constituents for all three samples. This work was previously presented in KEI's report (KEI-J88-1203.R1) dated December 16, 1988.

KEI returned to the site on November 29, 1989 when two 10,000 gallon underground fuel storage tanks, and one 280 gallon waste oil

tank were removed from the site. The gasoline tanks and the waste oil tank were made of steel and no apparent cracks or holes were observed in any of the tanks.

Water was initially encountered in the fuel tank pit at a depth of approximately 10.5 feet, thus prohibiting the collection of any soil samples from immediately beneath the tanks. Six soil samples, labeled SW1 through SW6, were collected from the sidewalls of the fuel tank pit approximately 18 to 30-inches above the water table. One soil sample, labeled W01, was collected from beneath the waste oil tank at a depth of 8.5 feet. The area beneath the waste oil tank was then excavated to ground water and two sidewall soil samples, labeled SWA and SWB, were collected from the waste oil tank pit sidewalls approximately 12-inches above the water table. Sample point locations are as shown on the attached Site Plan, Figure 2.

All soil samples were analyzed by Sequoia Analytical Laboratory in Redwood City, California. All of the fuel tank pit sidewall samples were analyzed for TPH as gasoline and BTX&E. Analytical results of the samples collected from the fuel tank pit showed TPH as gasoline levels ranging from non-detectable to 32 ppm, with benzene levels ranging from non-detectable to 1.2 ppm. The waste oil tank bottom and sidewall samples were analyzed for TPH as gasoline, BTX&E, TPH as diesel, total oil and grease (TOG), EPA 8010 constituents, and the metals - cadmium, chromium, lead and zinc. Analytical results of the waste oil pit soil samples indicated less than 50 ppm of TOG, non-detectable levels of BTX&E, TPH as diesel and EPA 8010 constituents, and less than 5.0 ppm of TPH as gasoline for all three samples. Metals concentrations were as indicated in Table 5.

KEI collected 11 pipe trench samples, labeled D1 through D6 and P1 through P5, at depths ranging from 3.5 to 6 feet on November 29, and December 5 & 29, 1989. Upon review of the analytical results for sample P2, KEI returned to the site on January 9, 1990, to collect additional soil samples. Following the trench excavation to a depth of 12 feet, one sample, labeled P2(12), was collected at a depth of 12 feet, and two samples, labeled SWP2E and SWP2W, were collected at a depth of 11 feet from the easterly and westerly sidewalls of the trench adjacent to sample point location P2(12). KEI completed the pipe trench sampling on January 10, 1990 when two samples, labeled P6 and P7, were collected at depths of 3 and 4 feet, respectively. Pipe trench sample point locations are as shown on the attached Site Plan, Figure 3. Analytical results of soil samples collected from the pipe trench indicated TPH as gasoline levels ranging from non-detectable to 15 ppm, with non-detectable to 0.13 ppm benzene for all samples except sample P2, which showed TPH as gasoline at 3,800 ppm and benzene at 6.1 ppm.

Following the additional excavation in the area of sample point P2, analytical results of samples P2(12), SWP2E and SWP2W indicated non-detectable levels of TPH as gasoline and benzene for samples P2(12) and SWP2W, while sample SWP2E showed TPH as gasoline at 20 ppm with non-detectable levels of benzene. Analytical results of the soil samples are summarized in Table 5.

After fuel tank pit soil sampling was completed, approximately 5,000 gallons of ground water was pumped from the fuel tank pit. On December 5, 1989, one water sample, labeled W1, was collected from the fuel tank pit. The water sample was analyzed for TPH as gasoline, BTX&E and EPA 8010 constituents. Analytical results of the water sample collected from the fuel tank pit indicated 7,900 ppb of TPH as gasoline, 850 ppb of benzene, and non-detectable levels of EPA 8010 constituents. Analytical results of the water sample are summarized in Table 6. The details of the soil and water sampling activities are presented in KEI's report (KEI-J88-1203.R2) dated January 15, 1990.

Based on the analytical results and in accordance with the guidelines established by the Regional Water Quality Control Board (RWQCB), KEI recommended the installation of three monitoring wells at the site to begin to define the extent of the soil and ground water contamination, and to determine the ground water flow direction.

On April 26 & 27, 1990, three two-inch diameter monitoring wells, designated as MW1, MW2 and MW3, were installed at the site. During drilling, an attempt was made to install MW2 near the pump island, however, drill bit refusal was encountered, and MW2 was installed at the modified location indicated on the attached Site Plan, Figure 1. The earlier attempts to install well MW2 resulted in the drilling of two shallow exploratory borings, designated as EB1 and EB2 on the attached Site Plan, Figure 1. The exploratory borings were backfilled to the surface with neat cement.

The three monitoring wells were drilled and completed to total depths ranging from 22 to 23 feet. The exploratory borings were drilled and/or sampled to depths of 8.5 and 10.5 feet. Ground water was encountered at depths ranging from 9.5 to 14.5 feet beneath the surface during drilling. The wells were developed on May 3 and 4, 1990, and initially sampled on May 11, 1990.

Water and selected soil samples were analyzed at Sequoia Analytical Laboratory in Redwood City, California, for TPH as gasoline, and BTX&E. In addition, sample EB2(9), collected from boring EB2, was analyzed for TPH as diesel and TOG.

Analytical results of the soil samples, collected from the borings for monitoring wells (MW1 and MW3), indicated non-detectable levels of TPH as gasoline in all soil samples. Analytical results of the soil samples, collected from the boring for monitoring well MW2, indicated levels of TPH as gasoline ranging from 2.2 ppm to 6.8 ppm. However, analytical results of the soil samples collected from boring EB2 indicated levels of TPH as gasoline ranging from 2,400 ppm to 12,000 ppm. In sample EB2(9), TPH as diesel was detected at 1,400 ppm, and TOG at 7,000 ppm. Benzene was detected in all soil samples collected from MW1, MW2 and MW3, except for samples MW2(10) and MW2(12), at levels ranging from 0.0075 ppm to 0.012 ppm. However, benzene was detected in samples EB2(7) and EB2(9) at concentrations of 5.0 ppm and 84 ppm, respectively.

Analytical results of the ground water samples, collected from monitoring wells MW1 and MW2, indicated levels of TPH as gasoline at 22,000 ppb and 65,000 ppb, respectively. Benzene was detected in samples MW1 and MW2, at levels of 590 ppb and 3,300 ppb, respectively. Analytical results of the ground water sample collected from MW3 showed non-detectable levels of all constituents analyzed. Results of the soil analyses are summarized in Table 4, and the water analyses in Table 2.

Based on the analytical results, KEI recommended implementation of a monthly monitoring and quarterly sampling program. In addition, KEI recommended the installation of three additional monitoring wells to further define the extent of ground water contamination. Also, KEI recommended additional soil excavation be conducted in the vicinity of borings EB1 and EB2 because of the level of the soil contamination detected. Details of the subsurface exploration and monitoring well installation activities are summarized in KEI's report (KEI-P88-1203.R7) dated May 31, 1990.

On August 14, 1990, three additional two-inch diameter monitoring wells (designated as MW4, MW5 and MW6 on the attached Site Plan, Figure 1) were installed at the site. The three wells were each drilled and completed to a total depth of 26 feet except for well MW4, which was completed at a depth of 25 feet. Ground water was encountered at depths ranging from 13.5 to 16.5 feet beneath the surface during drilling. The new wells were developed on August 21, 1990, and all wells were sampled on August 28, 1990. Water from all wells and selected soil samples from MW4, MW5 and MW6 were analyzed at Sequoia Analytical Laboratory in Concord, California, for TPH as gasoline and BTX&E. In addition, soil samples collected from the boring for monitoring well MW6 and water samples collected from monitoring well MW2 and MW6 were analyzed for TPH as diesel and TOG.

The analytical results of the soil samples collected from the borings for wells MW4, MW5 and MW6 showed non-detectable levels of TPH as gasoline and benzene in all samples analyzed, except for MW6(10), MW6(12.5) and MW6(15.5), which showed levels of TPH as gasoline at 18 ppm, 160 ppm and 2.5 ppm, respectively, and levels of benzene at 0.24 ppm, 3.4 ppm and 0.43 ppm, respectively. In addition, TPH as diesel was detected only in samples MW6(10) and MW6(12.5), at levels of 5.1 ppm and 93 ppm, respectively. Also, TOG was detected in sample MW6(12.5) at a level of 200 ppm.

The analytical results of the water samples collected from monitoring wells MW3 and MW5 indicated non-detectable levels of TPH as gasoline and benzene. Levels of TPH as gasoline and benzene were detected in wells MW1, MW2, MW4 and MW6 at concentrations ranging from 1,700 ppb to 62,000 ppb for TPH as gasoline, with benzene concentrations ranging from 140 ppb to 2,600 ppb. Also, TPH as diesel was detected in MW2 and MW6 at levels of 3,100 ppb and 1,000 ppb, respectively. Results of the soil analyses are summarized in Table 3, and the water analyses in Table 2. Based on these results, KEI recommended that a Hydropunch study be performed at the site and its vicinity to aid in determining the extent of ground water contamination in the vicinity of the site. Also, KEI proposed that the possible influence of tidal action on the ground water table gradient be evaluated. For further details, refer to KEI's report (KEI-P88-1203.R8) dated September 24, 1990.

#### RECENT FIELD ACTIVITIES - MONITORING ACTIVITIES

The six wells (MW1 through MW6) were monitored three times and sampled once during the quarter. In addition, monitoring wells MW1, MW2, MW4 and MW6 were purged of 55 gallons during each monthly monitoring event. During monitoring, the wells were checked for depth to water and presence of free product and sheen. No free product or sheen was noted in any of the wells during the quarter. Monitoring data are summarized in Table 1.

Water samples were collected from the wells on February 21, 1991. In addition, a duplicate water sample (MWD) was collected from monitoring well MW6. Prior to sampling, the wells were purged of between 15 and 55 gallons each using a surface pump. Samples were then collected using a clean Teflon bailer. Samples were decanted into clean VOA vials and/or one liter amber bottles as appropriate which were sealed with Teflon-lined screw caps and stored in a cooler on ice until delivery to the state certified laboratory.

#### HYDROLOGY AND GEOLOGY

Based on the water level data gathered during the quarter, ground water flow direction appeared to be generally toward the north-northeast at an average gradient of .009 on February 21, 1991, relatively unchanged from the previous quarter. Water levels have steadily increased during the quarter, showing a net increase of 1.7 to 2.61 feet in all wells since November 26, 1990. The measured depth to ground water at the site on February 21, 1991 ranged between 8.47 and 11.76 feet.

Based on review of regional geologic maps (U.S. Geological Survey Professional Paper 943, "Flatland Deposits - Their Geology and Engineering Properties and Their Importance to Comprehensive Planning", 1979), the subject site is underlain by relatively unconsolidated alluvial deposits described as fine-grained alluvium (Qhaf) typically consisting of clay and silt materials. In addition, the site is closely adjacent to a mapped geologic contact with Bay Mud (Qhbm) to the west.

Based on inspection of the tank pit excavation, the site is underlain by artificial fill materials to a depth of about 7.5 feet below grade. The fill materials are underlain by about 1.5 feet of adobe topsoil materials, which appears to inturn be underlain by light brown sandy silt containing a trace of fine gravel and light brown very fine-grained sand.

The results of our subsurface study from the borings for MW1, MW2 and MW3 indicated the site is underlain by artificial fill materials to depths of about 7 to 8 feet. Locally, the fill materials extend to depths of at least 8.5 and 10.5 feet in the vicinity of borings EB1 and EB2 (maximum depth explored). The fill materials are generally underlain by a 1.5 to 2 foot thick bed of silt which is inturn underlain by a persistent coarse-grained sequence of clayey to sandy gravel interbedded with clayey to silty sand to the maximum depth explored (23 feet).

The results of our most recent subsurface study from the borings for MW4, MW5 and MW6 indicated that the site is underlain by artificial fill materials to depths below grade of about 2.5 to 4.4 feet. The fill materials are inturn underlain by silty clay materials to depths below grade of about 8 to 12.7 feet. This silty clay zone is in turn underlain by a coarse-grained zone composed of clayey gravel and/or clayey sand materials extending to depths below grade of about 12.1 to 14.3 feet. This coarse-grained zone is in turn underlain by a clayey silt bed varying from about 1 to 3 feet in thickness and extending to depths below grade of about 14.2 to 14.8 feet in wells MW4 and MW5, and about 17.3 feet in MW6. The ground water table encountered during drilling activities was

detected within or immediately below the silt bed. This relatively thin clayey silt bed is underlain by a generally thick sequence of silty to clayey sand and gravel lenses extending to the maximum depth explored (26 feet), except in the boring for well MW5 where a second clayey silt bed was encountered at depths below grade of about 15.6 to 19.5 feet and where a clay bed was encountered at approximately 24 feet extending to the total depth drilled (26 feet).

#### ANALYTICAL RESULTS

Ground water samples were analyzed at Sequoia Analytical Laboratory in Concord, California, and were accompanied by properly executed Chain of Custody documentation. The samples were analyzed for TPH as gasoline using EPA method 5030 in conjunction with modified 8015, and BTX&E using EPA method 8020. In addition, the ground water samples collected from monitoring wells MW1, MW2, MW4 and MW6 were analyzed for TPH as diesel using EPA method 3510 in conjunction with modified 8015, and the water samples collected from monitoring wells MW2 and MW6 were also analyzed for TOG using Standard Method 5520B&F.

Analytical results of the ground water samples collected from monitoring well MW3, indicates non-detectable levels of TPH as gasoline and benzene. Analytical results of the ground water samples, collected from monitoring wells MW1, MW2, MW4 and MW6, indicate levels of TPH as gasoline at concentrations of 26,000 ppb, 3,400 ppb, 33,000 ppb and 750 ppb, respectively, and levels of benzene at concentrations of 280 ppb, 160 ppb, 210 ppb and 77 ppb, respectively. Benzene was non-detectable in monitoring well MW5 and TPH as gasoline was detected at 56 ppb. In monitoring wells MW1, MW2, MW4 and MW6, TPH as diesel was detected at concentrations of 690 ppb, 7,000 ppb, 4,100 ppb and 160 ppb, respectively. TOG was non-detectable in ground water samples collected from wells MW2 and MW6. The analytical results of the duplicate water sample (MWD) collected from monitoring well MW6 indicates a TPH as gasoline level of 740 ppb and a benzene level at 74 ppb. Concentrations of TPH as gasoline, benzene and TPH as diesel are shown on the attached Site Plan, Figure 1a. Results of the water analyses are summarized in Table 2. Copies of the analytical results and Chain of Custody documentation are attached to this report.

#### DISCUSSION AND RECOMMENDATIONS

In response to a letter dated August 1, 1990 from the Alameda County Health Care Services Agency, KEI has evaluated the effects of tidal action on ground water levels at the subject site. On January 18, 1991, a representative of KEI was at the site for an approximate 7-hour period to monitor any changes in the ground



water table elevation which might be related to tidal effects. All six monitoring wells were monitored 13 times for depth to water. All monitoring data is presented as Table 1a. The water table continuously decreased in each well during the seven hour monitoring period, from 0.09 feet to 0.11 feet, which represents only a 0.02 feet differential. The constant decrease in the water table at the site may be related to tidal action; however, the near uniform decrease in the wells indicates that the ground water flow direction does not change appreciably in response to any tidal actions and therefore KEI recommends that no further study be conducted at the site in relation to the possible effects of tidal actions.

As noted previously in this report, a duplicate ground water sample was collected from monitoring well MW6 during this quarter. As shown in the attached Table 2, the levels of TPH as gasoline and BTX&E detected in the duplicate sample (labeled MWD) are similar to those detected in sample MW6. Based on the analytical results of the duplicate sample, it appears that adequate lab quality assurance procedures were followed.

Based on the analytical results collected and evaluated to date and no evidence of free product or sheen in any of the wells, KEI recommends the continuation of the current monitoring and sampling program of the existing wells per KEI's proposal (KEI-P88-1203.P2) dated May 31, 1990. Based on the levels of TPH as diesel detected in monitoring wells MW1, MW2, MW4 and MW6, KEI recommends that samples collected from all monitoring wells during the next quarter also be analyzed for TPH as diesel by EPA method 3510 in conjunction with modified 8015. To date, samples collected from monitoring wells MW3 and MW5 have not been analyzed for TPH as diesel.

Soil excavation activities, previously proposed for the vicinity of borings EB1 and EB2 at the site (KEI-P88-1203.R2, dated May 31, 1990) were initiated on March 12, 1991. A technical report will be prepared upon completion of the soil excavation activities.

Also, the previously proposed Hydropunch survey was recently completed on February 20, 1991. KEI is currently waiting for the results of the Hydropunch survey. The results of the Hydropunch study will be presented in a forthcoming technical report and will be evaluated to determine the locations of additional ground water monitoring wells necessary to define the lateral limits of ground water contamination at the vicinity of the site.

DISTRIBUTION

A copy of this report should be sent to Ms. Cynthia Chapman of the Alameda County Health Care Services, and to the RWQCB, San Francisco Bay Region.

LIMITATIONS

Environmental changes, either naturally-occurring or artificially-induced, may cause changes in ground water levels and flow paths, thereby changing the extent and concentration of any contaminants.

Our studies assume that the field and laboratory data are reasonably representative of the site as a whole, and assume that subsurface conditions are reasonably conducive to interpolation and extrapolation.

The results of this study are based on the data obtained from the field and laboratory analyses obtained from a state certified laboratory. We have analyzed this data using what we believe to be currently applicable engineering techniques and principles in the Northern California region. We make no warranty, either expressed or implied, regarding the above, including laboratory analyses, except that our services have been performed in accordance with generally accepted professional principles and practices existing for such work.

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March 25, 1991  
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If you have any questions regarding this report, please do not  
hesitate to call me at (707) 746-6915.

Sincerely,

Kaprealian Engineering, Inc.



Thomas J. Berkins  
Senior Environmental Engineer



Don R. Braun  
Certified Engineering Geologist

License No. 1310  
Exp. Date 6/30/92

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Attachments: Tables 1 through 6  
Location Map  
Site Plans - Figures 1, 1a, 2 & 3  
Laboratory Analyses  
Chain of Custody documentation

KEI-P88-1203.QR2  
 March 25, 1991

TABLE 1

SUMMARY OF MONITORING DATA

<u>Date</u>	<u>Well No.</u>	<u>Ground Water Elevation (feet)</u>	<u>Depth to Water (feet)</u>	<u>Product Thickness</u>	<u>Sheen</u>	<u>Water Bailed (gallons)</u>
2/21/91	MW1	-6.40	11.58	0	None	55
	MW2	-6.23	10.06	0	None	55
	MW3	-5.17	8.47	0	None	15
	MW4	-6.49	11.76	0	None	55
	MW5	-6.35	10.96	0	None	15
	MW6	-6.24	10.55	0	None	55
1/21/91	MW1	-7.33	12.51	0	None	0
	MW2	-7.26	11.09	0	None	55
	MW3	-6.09	9.39	0	None	0
	MW4	-7.38	12.65	0	None	55
	MW5	-7.33	11.94	0	None	0
	MW6	-7.32	11.63	0	None	55
12/21/90	MW1	-7.48	12.66	0	None	55
	MW2	-7.27	11.10	0	None	55
	MW3	-6.59	9.89	0	None	0
	MW4	-7.59	12.86	0	None	55
	MW5	-7.43	12.04	0	None	0
	MW6	-7.29	11.60	0	None	55

<u>Well #</u>	<u>Surface Elevation* (feet)</u>
MW1	5.18
MW2	3.83
MW3	3.30
MW4	5.27
MW5	4.61
MW6	4.31

\* Elevation of top of well covers surveyed to Mean Sea Level (MSL).

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March 25, 1991

TABLE 1a

SUMMARY OF MONITORING DATA

(Conducted on January 18, 1991)

<u>Well #</u>	<u>Time</u>	<u>Ground Water Elevation (feet)</u>	<u>Depth to Water (feet)</u>
MW1	9:55 a.m.	-7.27	12.45
	10:22	-7.27	12.45
	10:34	-7.27	12.45
	10:55	-7.25	12.43
	11:29	-7.24	12.42
	11:57	-7.23	12.41
	12:29 p.m.	-7.21	12.39
	1:04	-7.21	12.39
	1:27	-7.21	12.39
	1:58	-7.20	12.38
	2:29	-7.18	12.36
	4:36	-7.19	12.37
	5:01	-7.19	12.37
	MW2	9:37 a.m.	-7.21
10:08		-7.20	11.03
10:25		-7.20	11.03
10:46		-7.18	11.01
11:20		-7.17	11.00
11:49		-7.15	10.98
12:23 p.m.		-7.14	10.97
12:55		-7.13	10.96
1:18		-7.14	10.97
1:50		-7.12	10.95
2:22		-7.11	10.94
4:24		-7.10	10.93
4:53		-7.10	10.93
MW3	9:34 a.m.	-6.13	9.43
	10:04	-6.12	9.42
	10:23	-6.11	9.41
	10:43	-6.11	9.41
	11:18	-6.09	9.39
	11:47	-6.08	9.38
	12:21 p.m.	-6.07	9.37
	12:53	-6.06	9.36
	1:16	-6.06	9.36
	1:48	-6.05	9.35
	2:20	-6.04	9.34
4:21	-6.02	9.32	
4:51	-6.02	9.32	

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TABLE 1a (Continued)

SUMMARY OF MONITORING DATA  
(Conducted on January 18, 1991)

<u>Well #</u>	<u>Time</u>	<u>Ground Water Elevation (feet)</u>	<u>Depth to Water (feet)</u>
MW4	9:51	-7.31	12.58
	10:17	-7.31	12.58
	10:31	-7.31	12.58
	10:53	-7.30	12.57
	11:27	-7.28	12.55
	11:55	-7.27	12.54
	12:27 p.m.	-7.24	12.51
	1:01	-7.24	12.51
	1:25	-7.25	12.52
	1:56	-7.23	12.50
	2:28	-7.22	12.49
	4:34	-7.22	12.49
	4:59	-7.22	12.49
	MW5	9:47 a.m.	-7.27
10:14		-7.27	11.88
10:29		-7.26	11.87
10:50		-7.25	11.86
11:25		-7.23	11.84
11:53		-7.22	11.83
12:25 p.m.		-7.20	11.81
1:00		-7.20	11.81
1:23		-7.20	11.81
1:54		-7.19	11.80
2:26		-7.17	11.78
4:30		-7.17	11.78
4:57		-7.17	11.78
MW6	9:42 a.m.	-7.24	11.55
	10:11	-7.23	11.54
	10:27	-7.22	11.53
	10:48	-7.21	11.52
	11:23	-7.19	11.50
	11:50	-7.18	11.49
	12:24 p.m.	-7.17	11.48
	12:57	-7.17	11.48
	1:21	-7.17	11.48
	1:53	-7.14	11.45
	2:23	-7.14	11.45
4:26	-7.14	11.45	
4:55	-7.14	11.45	

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TABLE 2  
 SUMMARY OF LABORATORY ANALYSES  
 WATER

<u>Sample Number</u>	<u>TPH as Diesel</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethyl-benzene</u>	<u>TOG</u>
(Collected on February 21, 1991)							
MW1	690	26,000	280	39	1,900	1,200	--
MW2	7,000	3,400	160	61	490	200	ND
MW3	--	ND	ND	ND	0.64	ND	--
MW4	4,100	33,000	210	21	12,000	3,800	--
MW5	--	56	ND	ND	4.7	ND	--
MW6	160	750	77	14	140	23	ND
MWD**	--	740	74	12	140	33	--
(Collected on November 26, 1990)							
MW1	--	2,900	160	2.3	320	330	--
MW2	3,800	15,000	1,600	450	2,100	1,100	ND
MW3	--	ND	ND	ND	ND	ND	--
MW4	--	49,000	360	36	11,000	3,800	--
MW5	--	ND	ND	ND	ND	ND	--
MW6	320	4,800	1,000	200	650	340	ND
"MW7"***	--	4,000	800	120	440	250	--
(Collected on August 28, 1990)							
MW1	--	1,700	140	1.4	150	180	--
MW2	3,100	27,000	2,600	1,300	3,000	1,900	ND
MW3	--	ND	ND	ND	0.70	ND	--
MW4	--	62,000	810	72	4,600	4,400	--
MW5	--	ND	ND	ND	1.2	ND	--
MW6	1,000	12,000	1,700	1,400	2,100	230	16
"MW7"***	--	2,600	180	3.0	270	810	--
(Collected on May 11, 1990)							
MW1	--	22,000	590	42	3,600	1,200	--
MW2	--	65,000	3,300	3,300	12,000	4,100	--
MW3	--	ND	ND	ND	ND	ND	--
Detection Limits	50	30	0.30	0.30	0.3	0.3	5.0

KEI-P88-1203.QR2  
March 25, 1991

TABLE 2 (Continued)

SUMMARY OF LABORATORY ANALYSES  
WATER

ND = Non-detectable.

-- Indicates analysis not performed.

\* "MW7" is a duplicate sample from MW1.

\*\* "MW7" and MWD are duplicate samples from MW6.

Results in parts per billion (ppb), unless otherwise indicated.



KEI-P88-1203.QR2  
March 25, 1991

TABLE 3

SUMMARY OF LABORATORY ANALYSES  
SOIL

(Collected on August 14, 1990)

<u>Sample Number</u>	<u>Depth (feet)</u>	<u>TPH as Diesel</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethyl-benzene</u>	<u>TOG</u>
MW4 (14.5)	14.5	--	ND	ND	ND	ND	ND	--
MW5 (13)	13	--	ND	ND	0.010	ND	ND	--
MW6 (5)	5	ND	ND	ND	0.042	ND	ND	ND
MW6 (10)		5.1	18	0.26	0.22	1.2	0.34	ND
MW6 (12.5)	12.5	93	160	3.4	12	3.6	20	200
MW6 (15.5)	15.5	ND	2.5	0.43	0.41	0.12	0.50	ND
Detection Limits		1.0	1.0	0.0050	0.0050	0.0050	0.0050	30

-- Indicates analysis not performed.

ND = Non-detectable.

Results in parts per million (ppm), unless otherwise indicated.

KEI-P88-1203.QR2  
March 25, 1991

TABLE 4

SUMMARY OF LABORATORY ANALYSES  
SOIL

(Collected on April 26 & 27, 1990)

<u>Sample Number</u>	<u>Depth (feet)</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethyl-benzene</u>
MW1(5)	5	ND	0.012	0.16	ND	ND
MW1(10)	10	ND	0.0094	0.024	ND	ND
MW1(14)	14	ND	0.0075	0.031	ND	ND
MW2(5)	5	2.4	0.075	0.0071	ND	ND
MW2(10)	10	2.2	ND	0.017	0.018	0.0088
MW2(12)	12	6.8	ND	0.028	0.015	0.10
MW3(5)	5	ND	0.0094	0.048	ND	ND
MW3(10)	10	ND	0.0088	0.015	ND	ND
EB2(7)	7	2,400	5.0	16	230	62
EB2(9)*	9	12,000	84	12	860	360
Detection Limits		1.0	0.0050	0.0050	0.0050	0.0050

ND = Non-detectable.

\* TPH as diesel was 1,400 ppm, and TOG was 7,000 ppm.

Results in parts per million (ppm), unless otherwise indicated.

KEI-P88-1203.QR2  
 March 25, 1991

TABLE 5

SUMMARY OF LABORATORY ANALYSES  
 SOIL

(Collected on November 29, and  
 December 5 & 29, 1989)

<u>Sample</u>	<u>Depth (feet)</u>	<u>TPH as Diesel</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethyl- benzene</u>
SW1	9.0	--	1.6	ND	ND	ND	ND
SW2	9.0	--	3.8	ND	ND	ND	ND
SW3	9.0	--	5.6	ND	ND	2.3	0.42
SW4	9.0	--	32	1.2	ND	1.0	2.1
SW5	9.0	--	4.8	0.20	ND	0.11	ND
SW6	8.0	--	ND	ND	ND	ND	ND
D1	3.5	--	ND	ND	ND	ND	ND
D2	3.5	--	1.5	0.08	ND	ND	ND
D3	3.5	--	6.6	0.14	ND	0.31	ND
D4	3.5	--	7.4	0.11	ND	0.1	ND
D5	3.5	--	1.9	ND	ND	ND	ND
D6	3.5	--	2.0	ND	0.17	0.25	ND
P1	6.0	--	15	0.086	ND	8.5	0.18
P2	5.5	--	3,800	6.1	290	750	140
P2 (12)	12.0	--	ND	ND	ND	ND	ND
P3	5.0	--	11	0.13	ND	1.3	0.18
P4	4.5	--	1.4	ND	ND	0.23	ND
P5	4.5	--	ND	ND	ND	ND	ND
P6	3.0	--	ND	ND	ND	ND	ND
P7	4.0	--	ND	ND	ND	ND	ND
SWP2E	11.0	--	20	ND	0.16	3.1	0.50
SWP2W	11.0	--	ND	ND	ND	ND	ND
WO1*	8.5	ND	1.6	ND	ND	ND	ND

KEI-P88-1203.QR2  
March 25, 1991

TABLE 5 (Continued)

SUMMARY OF LABORATORY ANALYSES  
SOIL

(Collected on November 29, and  
December 5 & 29, 1989)

<u>Sample</u>	<u>Depth (feet)</u>	<u>TPH as Diesel</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethyl- benzene</u>
SWA**	9.5	ND	2.1	ND	ND	ND	ND
SWB***	9.5	ND	3.9	ND	ND	ND	ND
Detection Limits		1.0	1.0	0.05	0.1	0.1	0.1

- \* TOG was <50 ppm, and all 8010 constituents were non-detectable. Metal concentrations were as follows: cadmium non-detectable, chromium 20 ppm, lead 75 ppm, and zinc 65 ppm.
- \*\* TOG was <50 ppm, and all 8010 constituents were non-detectable. Metals concentrations were as follows: cadmium non-detectable, chromium 20 ppm, lead 5.9 ppm and zinc 44 ppm.
- \*\*\* TOG was <50 ppm and all 8010 constituents were non-detectable. Metals concentrations were as follows: cadmium non-detectable, chromium 15 ppm, lead 5.0 ppm, an zinc 39 ppm.

-- Indicates analysis not performed.

ND = Non-detectable.

Results in parts per million (ppm), unless otherwise indicated.

KEI-P88-1203.QR2  
March 25, 1991

TABLE 6

SUMMARY OF LABORATORY ANALYSES  
WATER

(Collected on December 5, 1989)

<u>Sample #</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethylbenzene</u>
W1	7,900	850	150	720	ND
Detection Limits	30.0	0.3	0.3	0.3	0.3

NOTE: All EPA 8010 constituents were non-detectable.

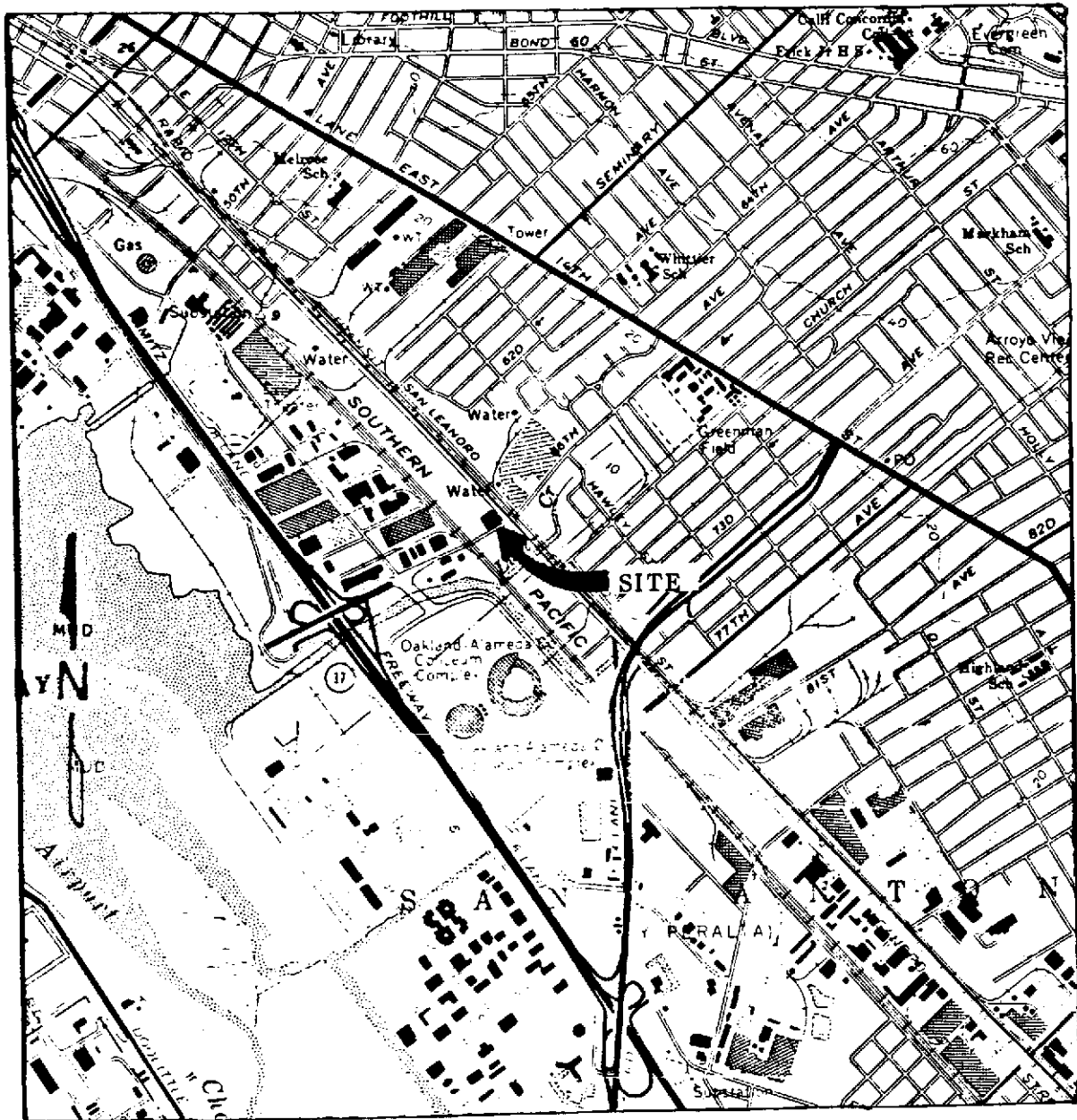
ND = Non-detectable.

Results in parts per billion (ppb), unless otherwise indicated.



**KAPREALIAN ENGINEERING, INC.**  
*Consulting Engineers*

P.O. BOX 996 • BENICIA, CA 94510  
(707) 746-6915 • (707) 746-6916 • FAX: (707) 746-5581



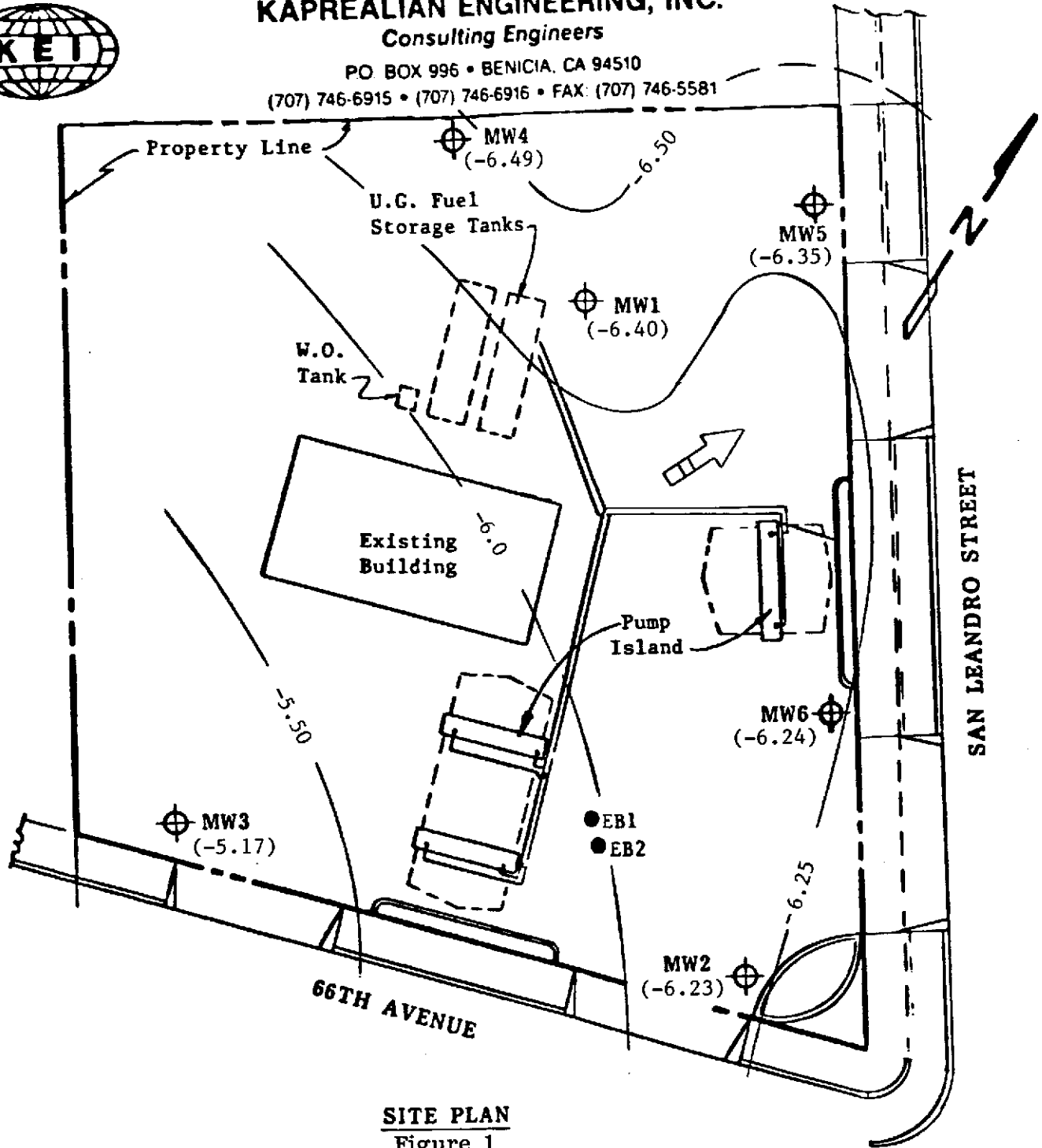
LOCATION MAP

Unocal S/S #3135  
845-66th Avenue  
Oakland, CA






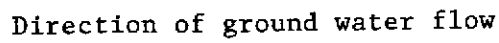
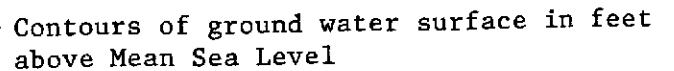
**KAPREALIAN ENGINEERING, INC.**  
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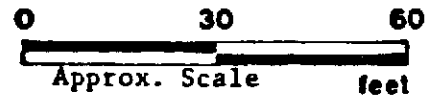
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**SITE PLAN**  
Figure 1

**LEGEND**

-  Monitoring Well
-  Exploratory Boring
-  Ground Water Elevation in feet above Mean Sea Level on 2/22/91
-  Direction of ground water flow
-  Contours of ground water surface in feet above Mean Sea Level



Unocal Service Station #3135  
845 - 66th Avenue  
Oakland, California

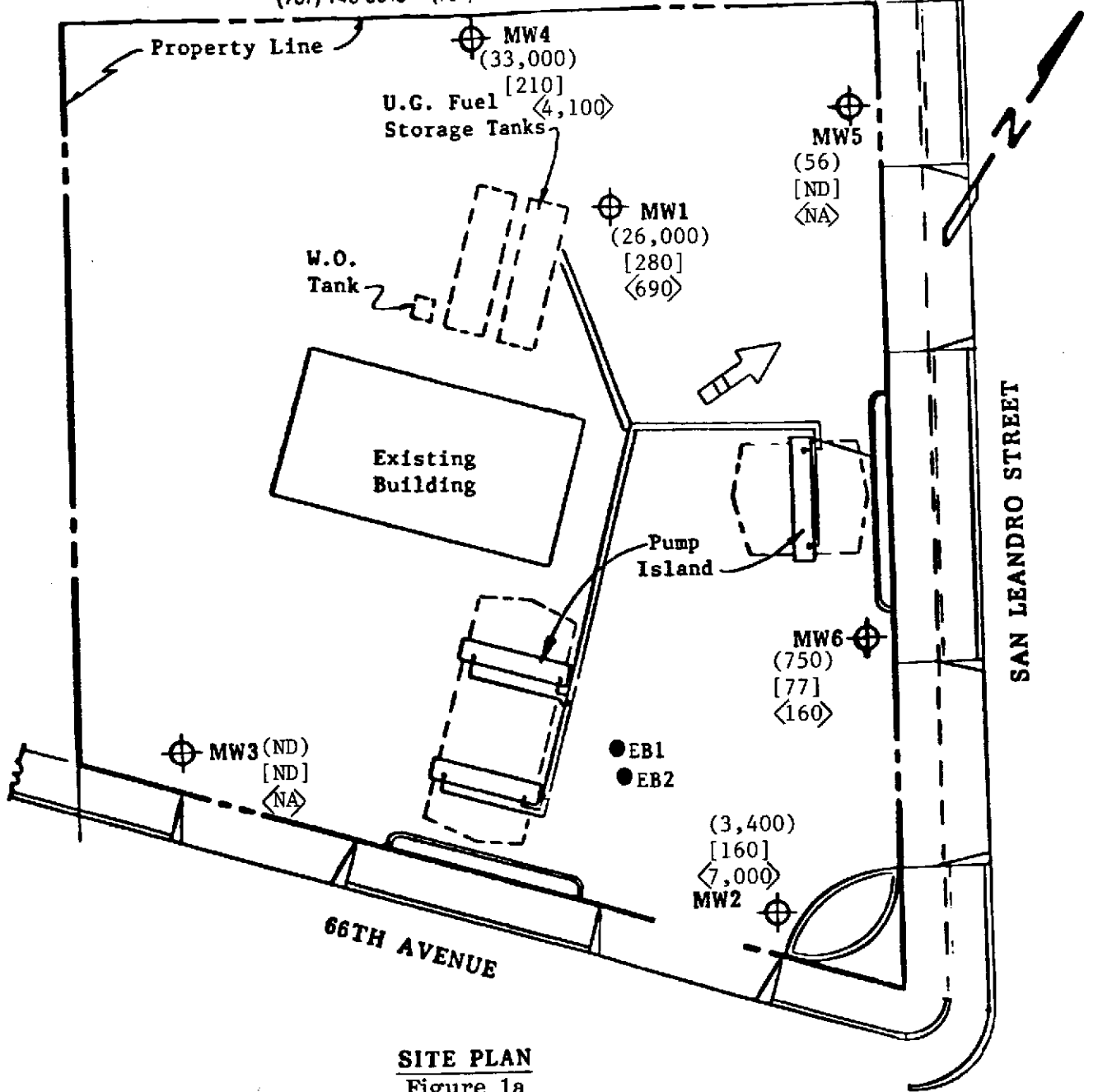


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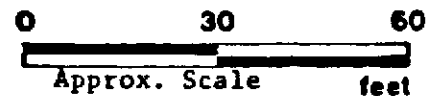
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**SITE PLAN**  
Figure 1a

**LEGEND**

- ⊕ Monitoring Well
- Exploratory Boring
- ( ) Concentration of TPH as gasoline (ppb)
- [ ] Concentration of benzene (ppb)
- < > Concentration of TPH as diesel (ppb)
- ➔ Direction of ground water flow
- ND = Non-detectable NA = Not analyzed



Unocal Service Station #3135  
845 - 66th Avenue  
Oakland, California



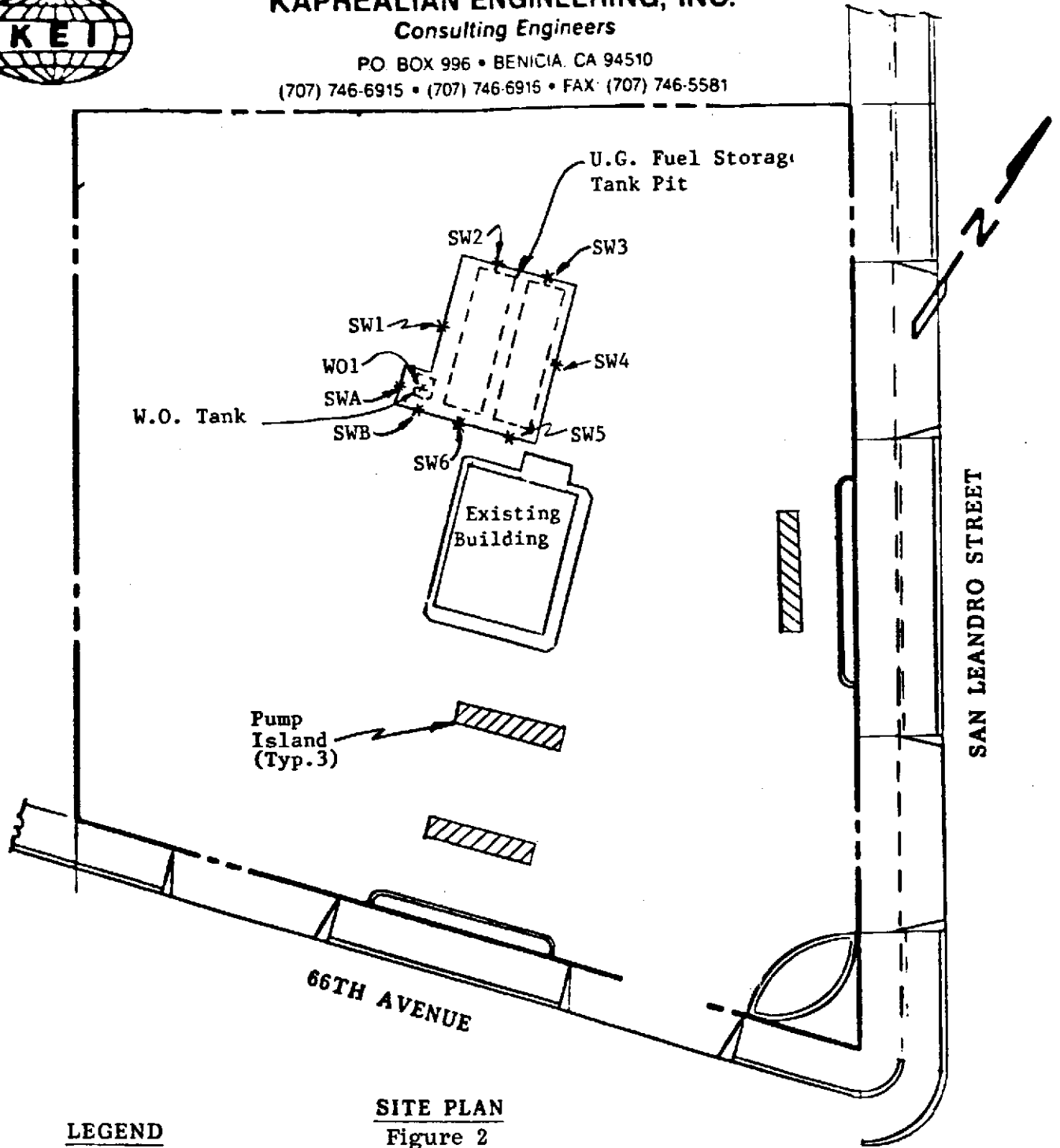


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### LEGEND

\* Sample Point Location

### SITE PLAN

Figure 2



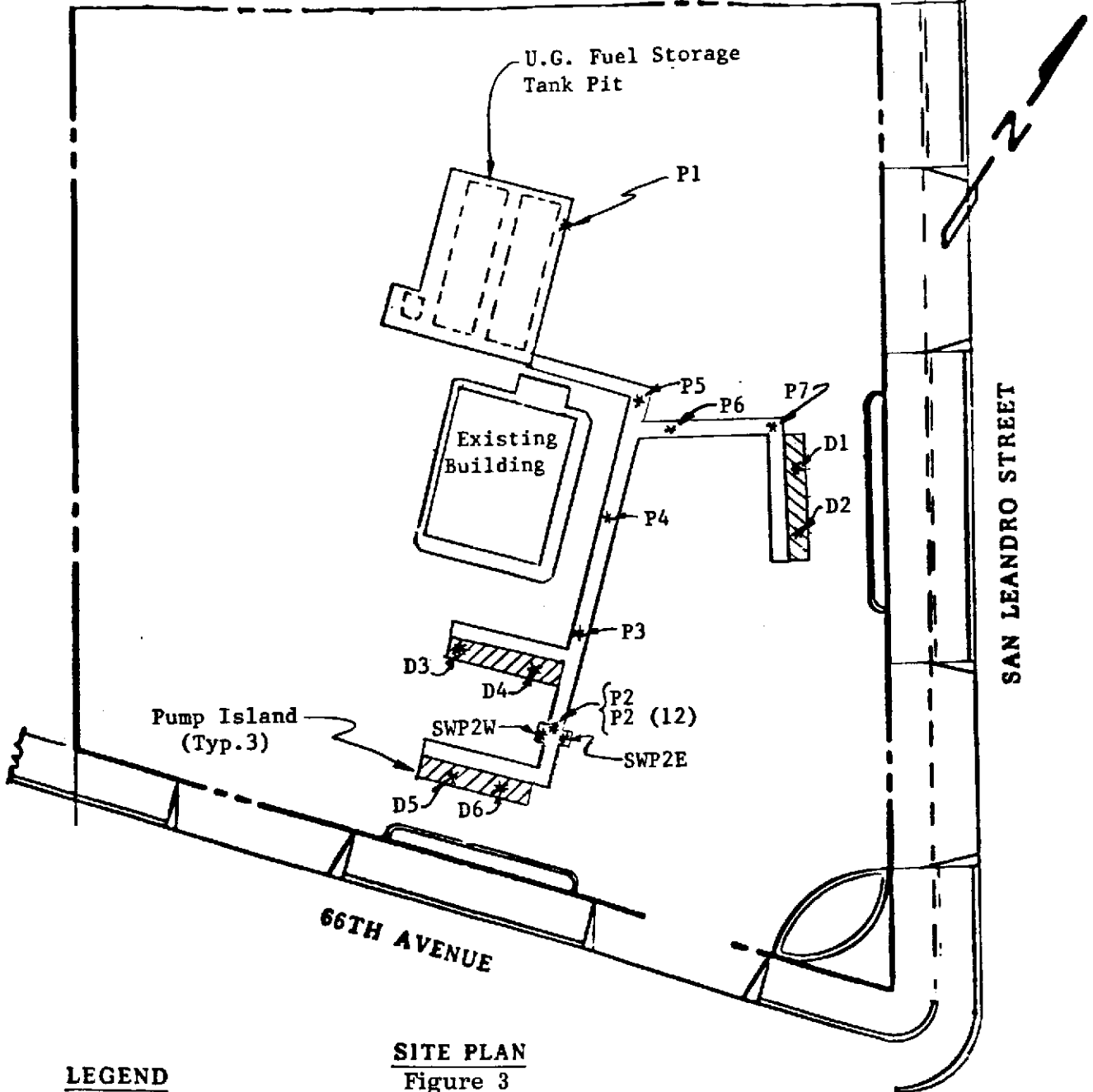


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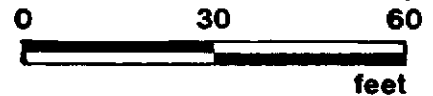


## LEGEND

\* Sample Point Location

## SITE PLAN

Figure 3



Unocal S/S #3135  
845 66th Avenue  
Oakland, CA



# SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520  
(415) 686-9600 • FAX (415) 686-9689

Kaprealian Engineering, Inc.	Client Project ID: Unocal, 845 66th Ave., Oakland	Sampled: Feb 21, 1991
P.O. Box 996	Matrix Descript: Water	Received: Feb 22, 1991
Benicia, CA 94510	Analysis Method: EPA 5030/8015/8020	Analyzed: Feb 26, 1991
Attention: Mardo Kaprealian, P.E.	First Sample #: 102-0512 A-B	Reported: Mar 7, 1991

## TOTAL PETROLEUM FUEL HYDROCARBONS with BTEX DISTINCTION (EPA 8015/8020)

Sample Number	Sample Description	Low/Medium B.P.	Ethyl			
		Hydrocarbons	Benzene	Toluene	Benzene	Xylenes
		$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)
102-0512 A-B	MW-1	26,000	280	39	1,200	1,900
102-0513 A-B	MW-2	3,400	160	61	200	490
102-0514 A-B	MW-3	N.D.	N.D.	N.D.	N.D.	0.64
102-0515 A-B	MW-4	33,000	210	21	3,800	12,000
102-0516 A-B	MW-5 *	56	N.D.	N.D.	N.D.	4.7
102-0517 A-B	MW6	750	77	14	23	140
102-0518 A-B	MW-D	740	74	12	33	140

**Detection Limits:**

30	0.30	0.30	0.30	0.30
----	------	------	------	------

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.  
Analytes reported as N.D. were not present above the stated limit of detection.

**SEQUOIA ANALYTICAL**

Belinda C. Vega  
Laboratory Director

**Please Note:**

\* Above samples do not appear to contain gasoline.



# SEQUOIA ANALYTICAL

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Kaprealian Engineering, Inc.  
P.O. Box 996  
Benicia, CA 94510  
Attention: Mardo Kaprealian, P.E.

Client Project ID: Unocal, 845 66th Ave., Oakland  
Matrix Descript: Water  
Analysis Method: EPA 3510/8015  
First Sample #: 102-0512 C

Sampled: Feb 21, 1991  
Received: Feb 22, 1991  
Extracted: Feb 27, 1991  
Analyzed: 2/28-3/1/91  
Reported: Mar 7, 1991

## TOTAL PETROLEUM FUEL HYDROCARBONS (EPA 8015)

Sample Number	Sample Description	High B.P. Hydrocarbons $\mu\text{g/L}$ (ppb)
102-0512 C	MW-1	690
102-0513 C	MW-2	7,000
102-0515 C	MW-4	4,100
102-0517 C	MW-6	160

Detection Limits:

50

High Boiling Point Hydrocarbons are quantitated against a diesel fuel standard.  
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

  
Belinda C. Vega  
Laboratory Director

1020512.KEI <2>



# SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520  
(415) 686-9600 • FAX (415) 686-9689

Kaprealian Engineering, Inc.  
P.O. Box 996  
Benicia, CA 94510  
Attention: Mardo Kaprealian, P.E.

Client Project ID: Unocal, 845 66th Ave., Oakland  
Matrix Descript: Water  
Analysis Method: SM 5520 B&F (Gravimetric)  
First Sample #: 102-0513 D

Sampled: Feb 21, 1991  
Received: Feb 22, 1991  
Extracted: Feb 27, 1991  
Analyzed: Mar 5, 1991  
Reported: Mar 7, 1991

## TOTAL RECOVERABLE PETROLEUM OIL

Sample Number	Sample Description	Oil & Grease mg/L (ppm)
102-0513 D	MW-2	N.D.
102-0517 D	MW-6	N.D.

Detection Limits:

5.0

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Belinda C. Vega  
Laboratory Director

1020512.KEI <3>



# KAPREALIAN ENGINEERING, INC.

## CHAIN OF CUSTODY

*ANALYSES REQUESTED*

SAMPLER <b>RAY (KET)</b>	SITE NAME & ADDRESS <b>UNOCAL OAKLAND 845 66TH AVE</b>	ANALYSES REQUESTED <b>TPHG BTXE TPHD (5520 TOG (5520 (CAF)</b>	TURN AROUND TIME: <b>REGULAR</b>
WITNESSING AGENCY		REMARKS	

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION	TPHG	BTXE	TPHD	TOG	REMARKS
MW1	2-21			X	X		2 UOA 1 AMB		X	X	X		
MW2	"			X	X		2 UOA 2 AMB		X	X	X	X	
MW3	4			X	X		2 UOA		X	X			
MW4	4			X	X		2 UOA 2 AMB		X	X	X		
MW5	4			X	X		2 UOA		X	X			
MW6	"			X	X		2 UOA 2 AMB		X	X	X	X	
MWD	"			X	X		2 UOA		X	X			

Relinquished by: (Signature) <i>Ray K</i>	Date/Time 2-21-91	Received by: (Signature) <i>H. N. ...</i>	Date/Time 14:22	The following MUST BE completed by the laboratory accepting samples for analysis: 1. Have all samples received for analysis been stored in ice? <u>Yes</u> 2. Will samples remain refrigerated until analyzed? <u>Yes</u> 3. Did any samples received for analysis have head space? <u>No</u> 4. Were samples in appropriate containers and properly packaged? <u>Yes</u>
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	

*Signature*      *Sample Control*      *2/21*  
Signature      Title      Date